



George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812



Materials and Processes
Laboratory, EM01

Metals Engineering
Branch, EM30

EM30-WI-009
02/11/2005

ORGANIZATIONAL WORK INSTRUCTION

EM30

TEMPERATURE CONTROLLER VERIFICATION PROCEDURE for PLATING FACILITY

**RELEASE
AUTHORITY**

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Marshall Space Flight Center Organizational Work Instruction EM30		
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DOCUMENT HISTORY LOG

Revision	Date	Originator	Description
Baseline	2-11-2005	N. Ogozalek	Document rebaselined due to reorganization of Departments and Laboratories at the Center.

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1 SCOPE

- 1.1 **SCOPE:** This document provides the verification procedure for plating tank temperature controllers and thermister probes for the Materials and Processes Laboratory, Metal Engineering Branch, Metallic Materials Engineering Team.
- 1.2 **PURPOSE:** This Work Instruction shall be used to check the accuracy of the Barnant Temperature Controllers and Thermister Probe system (TC&TP) utilized by EM30 in the plating tanks in Room 1124, Building 4612. Since in most cases, the controllers and probes are continually in operation, the frequency for which the accuracy of these systems are to be verified will depend on the operational status of the plating tank.
- 1.3 **APPLICABILITY:** This document is applicable to the Materials and Processes Laboratory, Metals Engineering Branch, Metallic Materials Engineering Team and support personnel who engage in plating activities in Room 1124, Building 4612.

2 APPLICABLE DOCUMENTS

- 2.1 MPR 8730.5 Control of Inspection, Measuring, and Test Equipment
- 2.2 MPR 1840.3 MSFC Hazardous Chemicals in Laboratories Protection Program
- 2.3 MWI 8550.1 Waste Management
- 2.4 MWI 8550.3 Wastewater Compliance
- 2.5 MWI 8550.5 Hazardous Material Management
- 2.6 Barnant Temperature Controller Operating Manual

3 DEFINITIONS

- 3.1 Temperature Controller and Thermister Probe System – The Barnant Temperature Controller and Thermister Probe combination as identified by colored tape.

4 INSTRUCTIONS

- 4.1 **PROCESS DESCRIPTIONS:**
 - 4.1.1 TC&TP instrumentation is designated as Calibration Category IV with verification frequency as designated in this Work Instruction.

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- 4.1.2 For plating tanks in frequent usage, the TC&TP shall be checked weekly. Frequent usage refers to articles being coated in the bath once per week or more often.
- 4.1.3 For plating tanks in periodic usage, the TC&TP shall be checked prior to use and once per week if actively plating longer than 1 week.
- 4.1.4 For plating tanks in “standby” mode, the TC&TP shall be checked after the electrolyte reaches operational temperature followed by weekly checks if actively plating longer than 1 week. “Standby” mode refers to plating tanks with electrolyte being maintained above ambient or higher with no plating being conducted.
- 4.1.5 For plating tanks not in operation (no heat applied), the TC&TP does not require periodic checking. Prior to tank startup, the TC&TP system shall be checked initially at ambient temperature and again after the electrolyte reaches operational temperature.
- 4.1.6 The temperature controller and probe shall constitute a system. Each system shall be uniquely identified by colored tape.
 - 4.1.6.1 Nickel sulfamate plating tank, “A,” 50 gallons – green
 - 4.1.6.2 Nickel-Cobalt sulfamate plating tank, “B,” 50 gallons – red
 - 4.1.6.3 Nickel sulfamate plating tank, 35 liters – yellow
 - 4.1.6.4 Nickel - Cobalt plating tank, 35 liters - blue

4.2 ***PROCEDURES:***

- 4.2.1 Verify the tape identification for the controller and probe match.
- 4.2.2 Verify the calibrated instrument is within its calibration interval.
- 4.2.3 Clean the calibrated probe/thermometer with demineralized water before placing in the electrolyte.
- 4.2.4 If demineralized water has been added to the plating tank, wait approximately 10 minutes with the pump operational before taking a measurement.
- 4.2.5 Measure the electrolyte temperature with one of the calibrated probes/thermometer. Place the calibrated probe/thermometer next to the thermister probe and wait until the measurement is stable. Record the data on the TC&TP logsheet, EM30-Form-03.

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- 4.2.6 Rinse the calibrated probe/thermometer with demineralized water with the rinsings flowing into the same plating tank after the measurement has been completed.
- 4.2.7 The measured temperature by the calibrated probe/thermometer should agree with the TC&TP within ± 1.0 degrees F.
- 4.2.8 If the measurements do not agree within ± 1.0 degrees F., recheck using a different calibrated instrument.
- 4.2.9 If the measurements again do not agree, verify the thermister is properly connected to the controller, ensure the thermister is not located too close to the heater, and ensure the pump is operational. Also, remove the thermister from the solution and verify the probe is not encrusted with crystals or visibly damaged. Repeat the measurement.
- 4.2.10 If the measurements still do not agree, replace the thermister with another. Repeat the measurement.
- 4.2.11 Check the questionable thermister with a different controller and plating tank setup. If the thermister does not measure accurately, submit the thermister for repair or tag and notate accordingly.
- 4.2.12 In the event that a controller or probe must be changed, the new equipment shall be marked to maintain the unique identification of the TC&TP system for the specific tank.
- 4.2.13 Record the thermister changeout in the plating tank logbook, the room logbook, or TC&TP logsheet, EM30-Form-03.
- 4.2.14 Inform the EM30 Calibration Point-of-Contact of the instrumentation change so that the change may be made in the calibration logsheet.

5 NOTES

- 5.1 None.

6 SAFETY PRECAUTIONS AND WARNING NOTES

- 6.1 Safety glasses shall be worn if the tank cover is not in place when measuring the plating electrolyte temperature.
- 6.2 Safety glasses and gloves shall be worn when using the mercury filled Kessler glass thermometer.

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- 6.3 All liquid and solid waste generated from plating activities shall be considered hazardous waste and disposed of according to applicable documents.
- 6.4 Refer to MPR 1840.3 as required.

7 APPENDICES, DATA, REPORTS, AND FORMS

- 7.1 Temperature Controller & Thermister Probe Logsheet, EM30-Form-03.
- 7.2 EM30 Calibration Logsheet

8 QUALITY RECORDS

- 8.1 The following listing includes EM30 Quality Records that are collected and saved during plating activities.
- 8.1.1 Plating Tank Logbook – shall be maintained in Room 1124 files
- 8.1.2 Room 1124 Logbook – shall be maintained in Room 1124 files
- 8.1.3 EM30-Form-003 – shall be maintained in Room 1124 files
- 8.2 All schedules pertaining to EM30 Quality Record retention and disposition are compiled in the EM30 Quality Records Listing located on the master list of the EM30 group website <http://maptis.nasa.gov/em30/em30masterlist.html>

9 TOOLS, EQUIPMENT, AND MATERIALS

- 9.1 **CALIBRATION:** Instrumentation calibration category designation is as specified according to MPR 8730.5.
- 9.2 Barnant (*Digi-Sense*) (*Cole Parmer*) Temperature Controllers R/S, Advanced Model # 89000-15.
- 9.3 Thermister Probes, # E-93824-12.
- 9.4 Fisher Digital Thermometer & Probe Serial # 20204952, MCMS # M65011, Calibration Category I.
- 9.5 Fisher Digital Thermometer & Probe, MCMS # M650159, Calibration Category I.
- 9.6 Kessler Glass Thermometer, Serial # 1504114, MCMS # M649866, Calibration Category I.

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- 9.7 Fisher Scientific Model 14-648-44, "Lollipop" thermometer, Serial # 240175430, designated with orange tape.
- 9.8 Fisher Scientific Model 14-648-44, "Lollipop" thermometer, Serial # 240175609, designated with purple tape.
- 9.9 Fisher Scientific Model 14-648-44, "Lollipop" thermometer, Serial # 240175983, designated with blue tape.
- 9.10 Fisher Scientific Model 14-648-44, "Lollipop" thermometer, Serial # 240176012, designated with red tape.

10 PERSONNEL TRAINING AND CERTIFICATION

- 10.1 The primary operator of each temperature controller utilized by EM30 personnel shall receive operations training from one or both of the following sources.
 - 10.1.1 Previous primary temperature controller operator.
 - 10.1.2 Temperature controller's manufacturer training representative.
- 10.2 Temperature controller operations will not be allowed until basic safety, maintenance, and operational readiness have been achieved by the operator.

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